



# Helping With Math

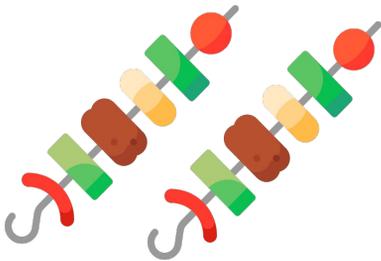
## Parallel Lines Cut by a Transversal



**GRADE 8**



Parallel lines are everywhere. Railways, edges of window or door, lines on a notebook, etc. suggest parallel lines. Two parallel lines when cut by another line called transversal form eight angles.



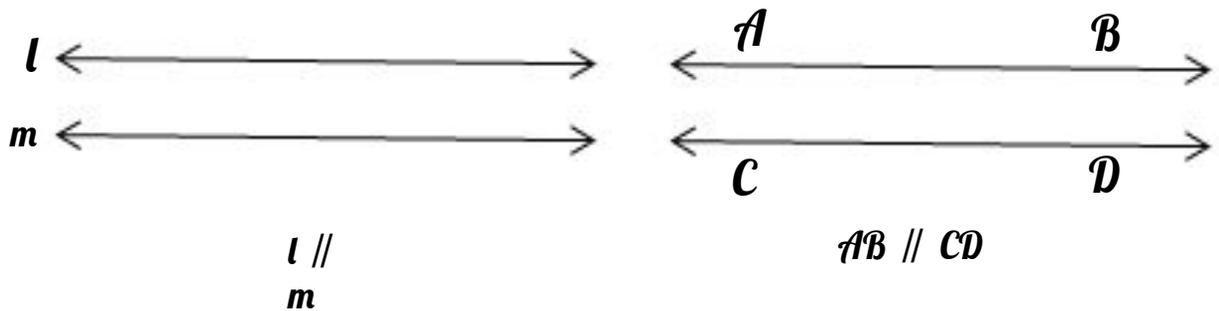
### All about Parallel lines cut by a Transversal

- Parallel lines are 2 coplanar lines which do not intersect.
- A line that cuts 2 or more parallel lines is called transversal.
- There are 8 angles formed when a transversal cut 2 parallel lines.
- The angles can be classified as corresponding angles, alternate interior angles, alternate exterior angles, same side interior angles, and same side exterior angles.

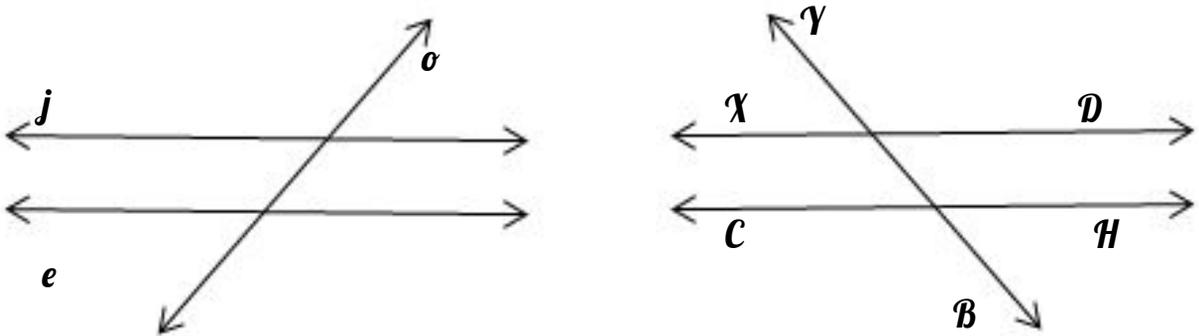


# PARALLEL LINES

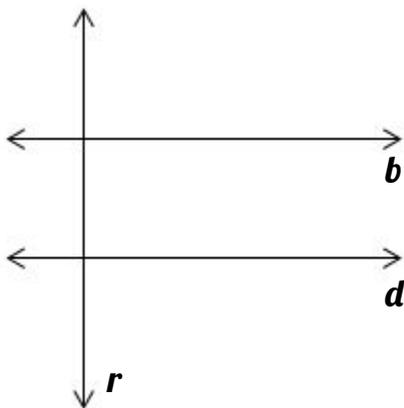
Two lines are parallel if and only if they do not intersect no matter how far they are extended. The symbol used to denote parallelism is  $//$ .



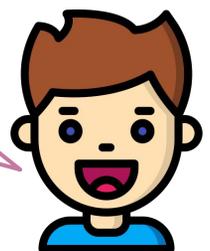
The following figures are examples of two parallel lines cut by a transversal.



Lines  $\sigma$  and  $\gamma B$  are called transversal lines.



Line  $r$  is the transversal line of parallel lines  $b$  and  $d$ .



## ANGLES FORMED

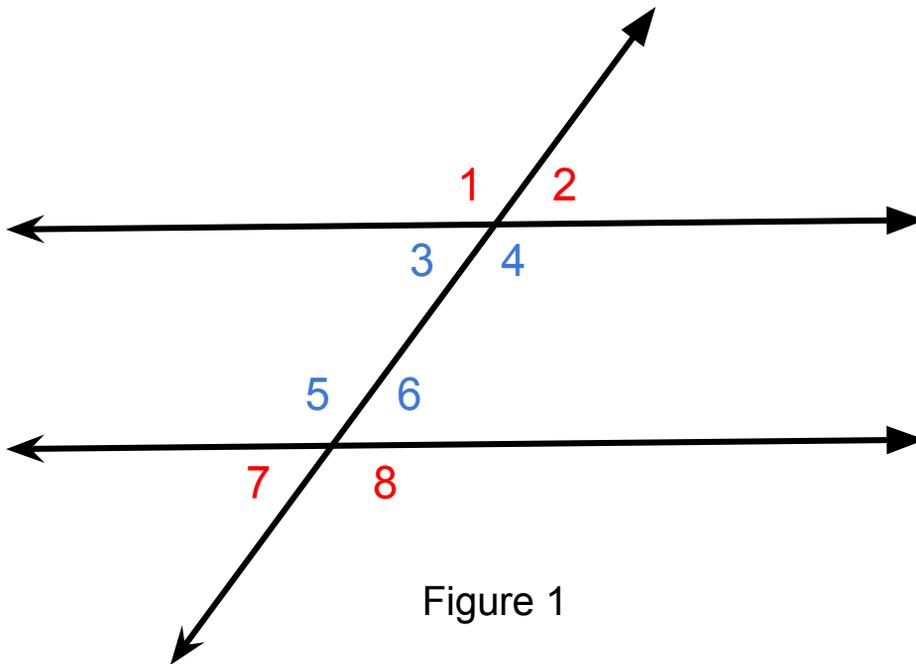
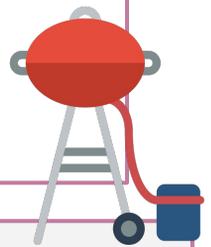


Figure 1



The angles ( $\angle$ ) formed by two parallel lines and a transversal are:

- **Interior Angles.** These are the four angles inside the parallel lines.
  - Interior Angles  
 $\angle 3, \angle 4, \angle 5, \angle 6$
- **Exterior Angles.** These are the four angles outside the parallel lines.
  - Exterior Angles  
 $\angle 1, \angle 2, \angle 7, \angle 8$
- **Alternate Interior Angles.** The two pairs of angles inside the parallel lines on opposite sides of transversal
  - .Alternate Exterior Angles  
 $\angle 3$  and  $\angle 6$  and  $\angle 4$  and  $\angle 5$



## ANGLES FORMED

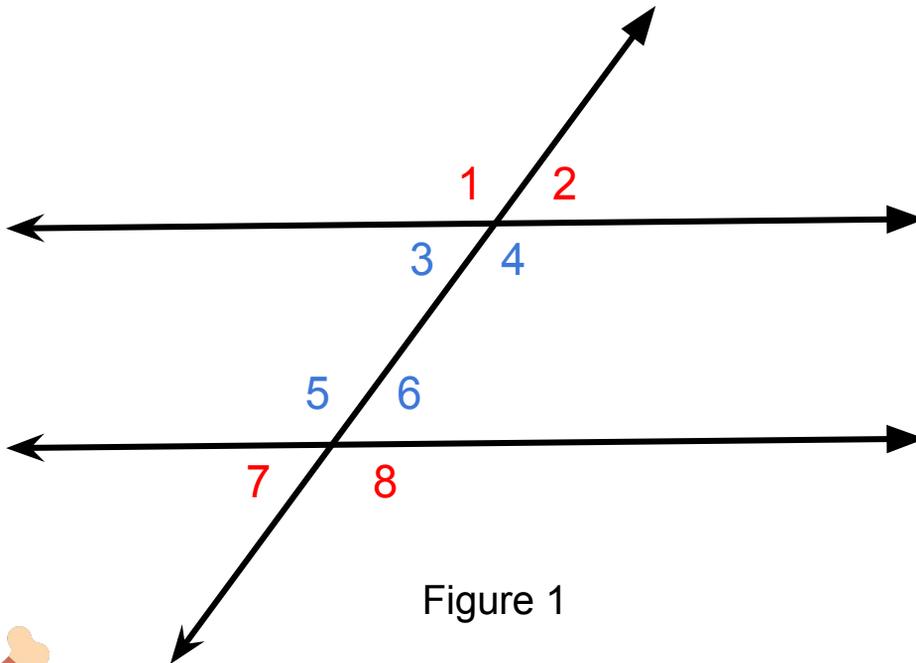
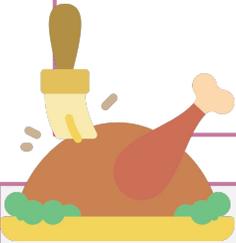


Figure 1



- **Alternate Exterior Angles.** The two pairs of angles outside the parallel lines on opposite sides of transversal.
  - Alternate Exterior Angles
    - $\angle 1$  and  $\angle 8$
    - $\angle 2$  and  $\angle 7$
- **Corresponding Angles.** Pair of angles, one inside the parallel lines, the other outside the parallel lines, but both on one side of the transversal.
  - Corresponding Angles
    - $\angle 1$  and  $\angle 5$        $\angle 2$  and  $\angle 6$
    - $\angle 3$  and  $\angle 7$        $\angle 4$  and  $\angle 8$



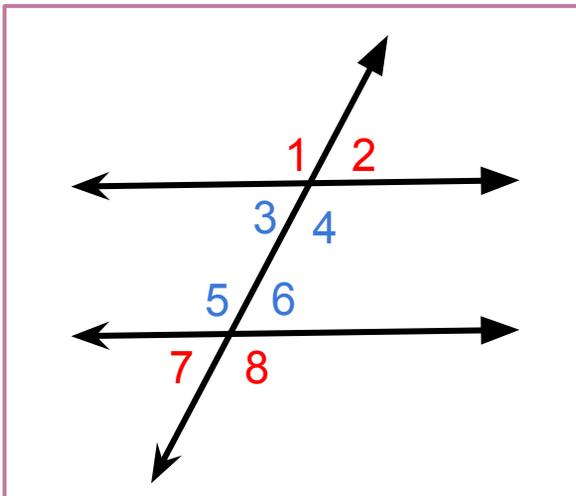
## ANGLE MEASUREMENTS



### Remember!

- If two parallel lines are cut by a transversal, then
- Corresponding  $\angle$ s are congruent.
  - Alternate exterior  $\angle$ s are congruent.
  - Alternate interior  $\angle$ s are congruent.
  - Same side interior  $\angle$ s are supplementary.
  - Same side exterior  $\angle$ s are supplementary.

Given: If  $\angle 1 = 70^\circ$ , find the measure of the other angles.



- $\angle 1 = 70^\circ$
- $\angle 2 = 110^\circ$
- $\angle 3 = 110^\circ$
- $\angle 4 = 70^\circ$
- $\angle 5 = 70^\circ$
- $\angle 6 = 110^\circ$
- $\angle 7 = 110^\circ$
- $\angle 8 = 70^\circ$

If  $\angle 5 = 45^\circ$ , find the measure of the other angles. Write your answers below.

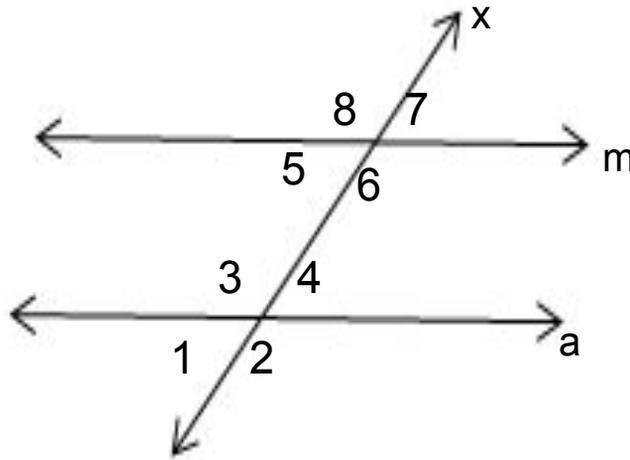


## PRACTICE EXERCISES

Give it a try!



Consider the figure



A. Color the circle of each angle based on its classification.

Interior angles...red  
Exterior angles...blue



B. Complete the table below by proving that  $\angle 5 + \angle 3 = 180^\circ$  given that  $m \parallel a$  with  $x$  a transversal.

Statement	Reason
	Given
$\angle 5$ and $\angle 3$ are supp. $\angle$ s	
$\angle 5 + \angle 3 = 180^\circ$	



# TABLE OF ACTIVITIES

1. It's Barbeque Night!
2. Yummy Kebab
3. Grilled Vegetables
4. Kenny the Chef
5. Seafood Plate
6. Temperature Rising
7. Don't Make It Burn
8. Smokey Flavor
9. Skewers
10. The BBQ Party

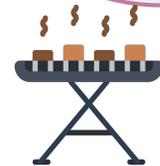


# IT'S BARBEQUE NIGHT!

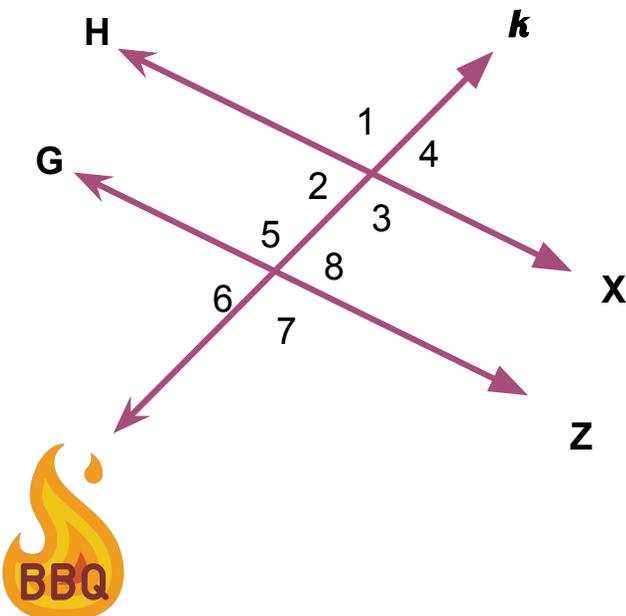
It's barbeque night! While waiting for the food to complete, try to answer this word hunt by encircling the words written below.

M	Y	R	A	T	N	E	M	E	L	P	P	U	S	C
	L	E	L	L	A	R	A	P	X	G	T	L	O	G
X	F	V	K	Q	V	U	T	U	O	Z	Q	R	V	L
T	U	E	Y	L	X	W	S	R	J	U	R	E	Q	A
R	R	X	W	F	A	Z	P	H	M	E	Q	L	V	U
A	T	O	Y	U	W	S	B	K	S	W	R	O	Y	Q
N	L	F	I	S	L	J	R	P	R	O	M	G	U	E
S	T	J	E	R	D	P	O	E	I	Q	F	I	J	P
I	F	Z	K	A	E	N	L	R	V	U	B	G	A	Z
T	E	P	R	M	D	T	E	A	K	S	I	V	B	K
I	N	L	U	I	B	T	X	R	N	O	N	Y	M	P
V	D	A	N	J	N	U	W	E	C	G	F	A	D	Z
E	J	G	B	I	G	E	C	X	K	T	L	B	R	M
K	B	W	M	Z	J	F	K	Z	B	E	Z	E	P	T
L	M	K	U	G	T	A	D	O	A	J	L	D	N	Y

- Parallel
- Transversal
- Angle
- Transitive
- Corresponding
- Interior
- Exterior
- Equal
- Supplementary



Find and circle these words.

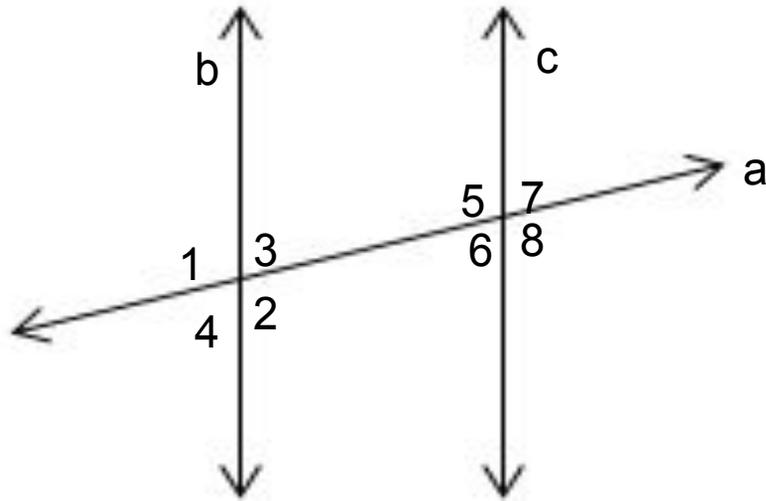


- What are the parallel lines in the given? \_\_\_\_\_
- What is the name of the transversal? \_\_\_\_\_
- Name two interior angles  
\_\_\_\_\_
- Name two exterior angles  
\_\_\_\_\_

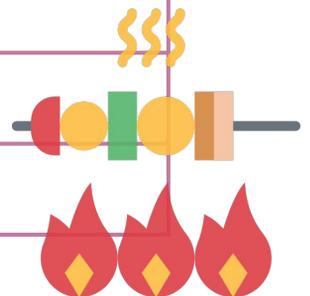


# YUMMY KEBAB

These yummy kebabs will be yours once you have identified these angles formed by parallel lines and a transversal.



Angle Name	Angle Classification
$\angle 1$	1.
$\angle 2$ and $\angle 5$	2.
$\angle 3$	3.
$\angle 4$ and $\angle 8$	4.
$\angle 5$	5.
$\angle 6$ and $\angle 2$	6.
$\angle 7$	7.
$\angle 8$ and $\angle 1$	8.



# GRILLED VEGETABLES

Don't forget to grab nutritious food during the BBQ night! All these grilled vegetables will be yours if you will be able to identify the term being described on each given.

1. These are coplanar lines that do not intersect and equidistant to each other.



2. This refers to a line that cut two or more parallel lines and produces angles.



3. This pair of angles has angle measurements that adds up to 180 degrees.



4. Angles outside the parallel lines on opposite sides of transversal.



5. These are the four angles outside the parallel lines.

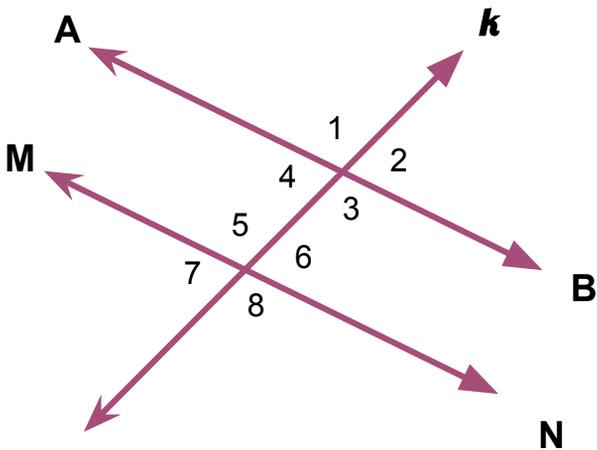


6. These angles have the same angle measurement.

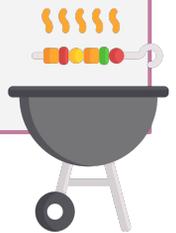


# KENNY THE CHEF

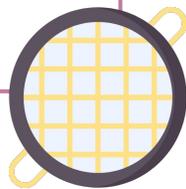
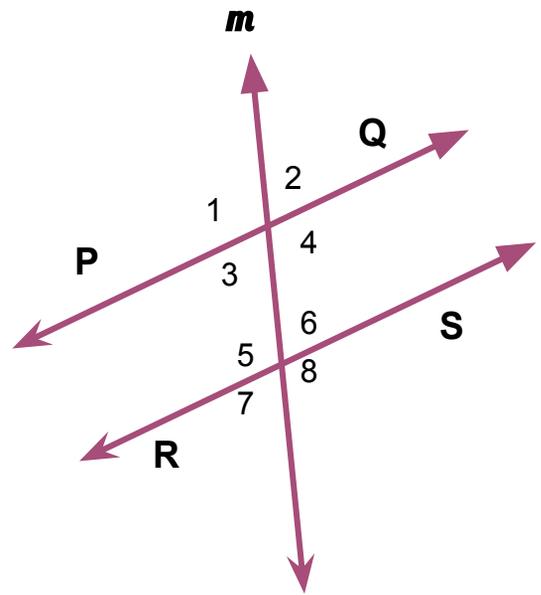
Kenny will throw a picnic party! Help him complete his menu by determining the following angle measurement.



AB is parallel to MN.  $k$  is a transversal. If  $\angle 5 = 36^\circ$ , what are the measurement of the other angles?

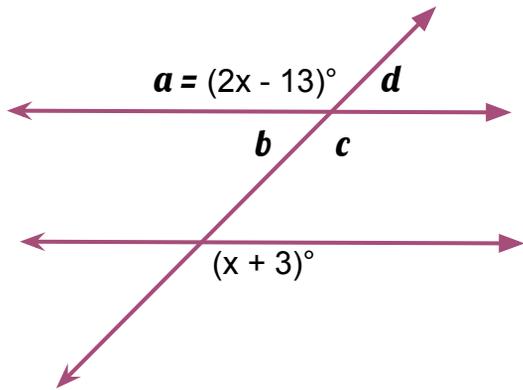


$m$  cuts parallel line PQ and RS. If  $\angle 8 = 102^\circ$ , find the measurement of the other angles.

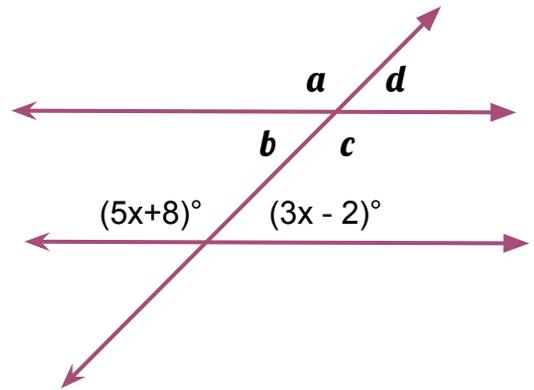


# SEAFOOD PLATE

A seafood plate cannot miss the enjoyment of a picnic day! Grab your favorite seafood dish and answer the following questions.



Find the value of  $x$ ,  $a$ ,  $b$ ,  $c$ , and  $d$ .



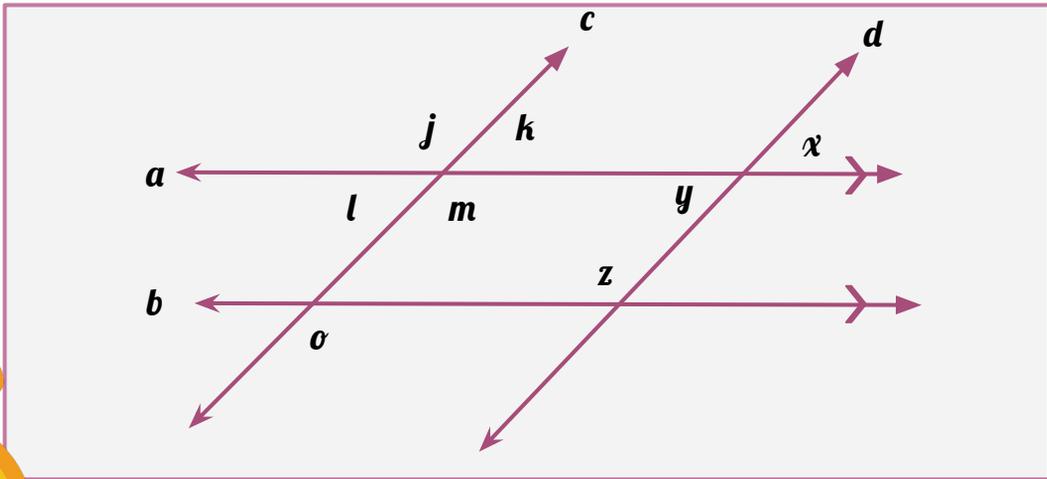
Find the value of  $x$ ,  $a$ ,  $b$ ,  $c$ , and  $d$ .



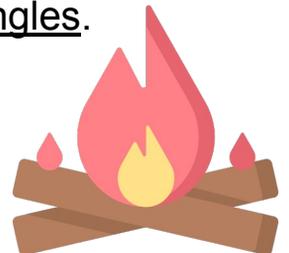
# TEMPERATURE RISING

Always remember that when having a BBQ party, accident might happen. To avoid the rising of temperature and burnt food, determine if the following statements are TRUE or FALSE.

Kindly refer to the figure below. Write TRUE if the statement is correct. Otherwise, replace the underlined word with a correct one.

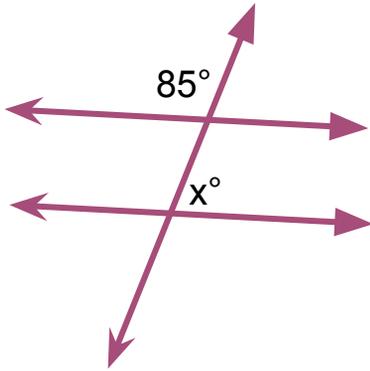


1. Line  $c$  and line  $d$  are transversal lines of parallel lines  $a$  and  $b$ .  
\_\_\_\_\_
2.  $\angle j$  and  $\angle m$  have the same angle measurement.  
\_\_\_\_\_
3. If  $m\angle o = 48^\circ$ , then  $m\angle l = \underline{132^\circ}$ .  
\_\_\_\_\_
4.  $\angle k$  and  $\angle o$  are corresponding angles.  
\_\_\_\_\_
5.  $\angle z$  and  $\angle y$  are exterior angles.  
\_\_\_\_\_
6. If  $m\angle l = 60^\circ$ , then  $m\angle m = \underline{60^\circ}$ .  
\_\_\_\_\_

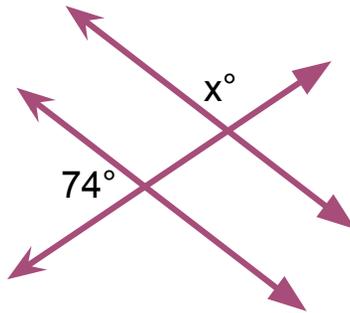


# DON'T MAKE IT BURN

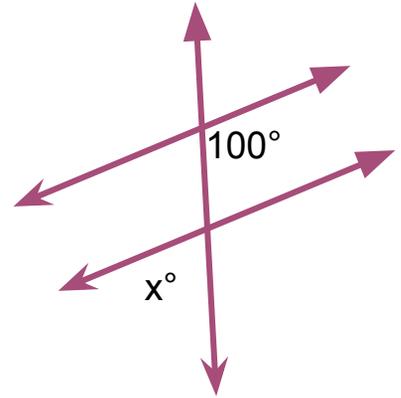
Make sure not to burn the grilled foods for our picnic today! Do that by solving the following.



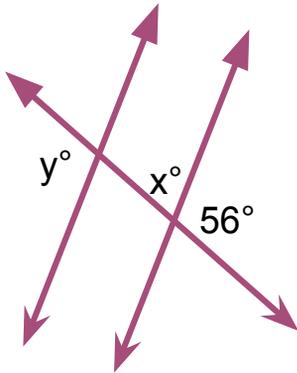
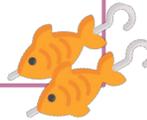
1.



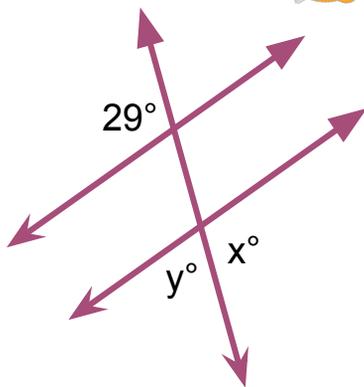
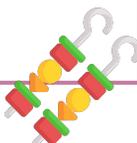
2.



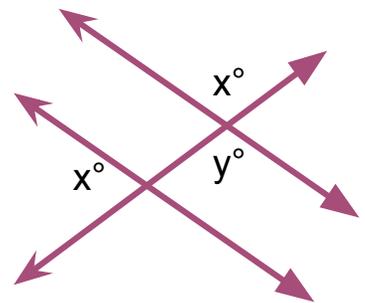
3.



4.



5.

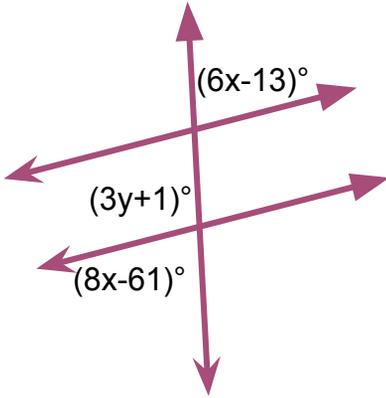


6.



# SMOKEY FLAVOR

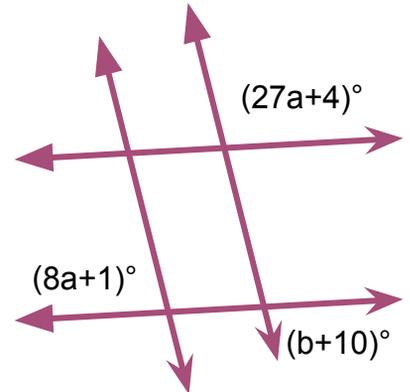
Whoa! That smokey flavor makes us really hungry. We can now eat these grilled foods after solving for the unknown values.



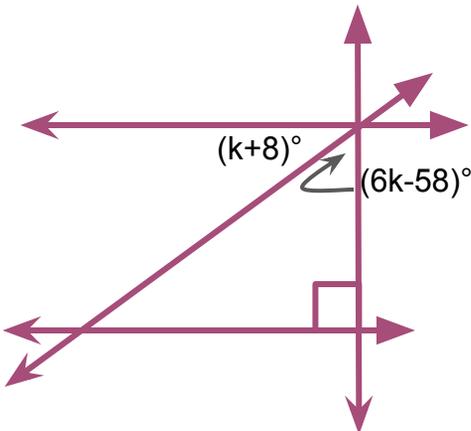
1. Solve for  $x$  and  $y$ . Then find the measurement of the three given angles.



2. Solve for  $a$  and  $b$ . Then find the measurement of the three given angles.

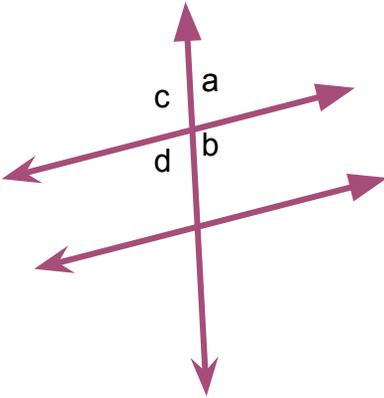


3. Solve for  $k$ . Then find the measurement of the two given angles.

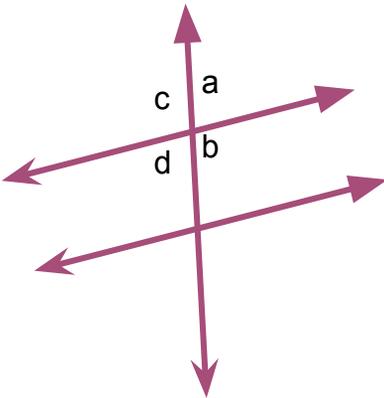


# SKEWERS

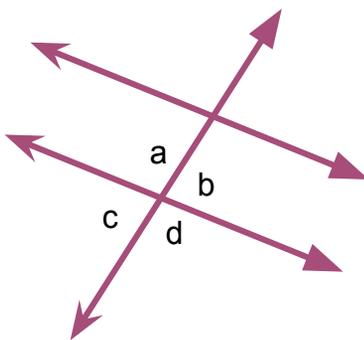
Jane is craving for the yummy skewers. She will only have if she managed to answer the following items correctly.



1. Jane's friend told Andy that the angle measure of  $a$  and  $b$  is just the same. Is this claim true? Why or why not?



2. Jane told her sister that the sum of  $a$ ,  $b$ ,  $c$ , and  $d$  is the same as the total sum of the angles of a circle. Is this true? Justify your answer.

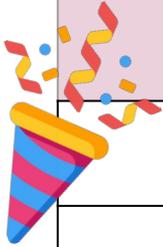


3. Jane told her sister that  $a$ ,  $b$ ,  $c$ , and  $d$  can be congruent angles. Is that possible? Explain your answer.

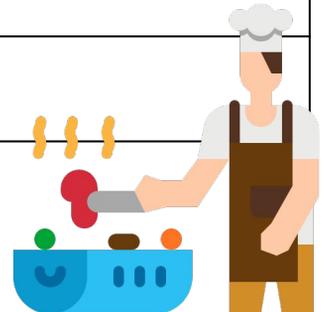
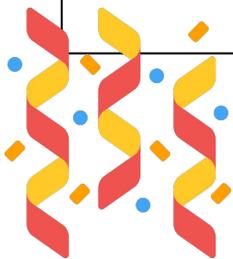


# THE BBQ PARTY

Your Dad is throwing a bbq party! Look around you. List down the name of objects that display parallel lines. Provide 10 objects.



Name of the Object	Why Is It Parallel?



# ANSWER GUIDE

## ACTIVITY 1



1. The parallel lines are HX and GZ.
2. The transversal line is line k
3. Angles 2, 3, 5, and 8 are interior angles
4. Angles 6, 7, 1, and 4 are exterior angles.

## ACTIVITY 2

- |                   |                          |
|-------------------|--------------------------|
| 1. Exterior angle | 2. Alt.interior angles   |
| 3. Interior angle | 4. Same-side Ext. angle  |
| 5. Interior angle | 6. Same-side int. Angles |
| 7. Exterior angle | 8. Alternate Ext. Angle  |

## ACTIVITY 3

- |                              |                   |                  |
|------------------------------|-------------------|------------------|
| 1. Parallel lines            | 2. Transversal    | 3. Supplementary |
| 4. Alternate Exterior Angles | 5. Exterior angle | 6. Congruent     |

## ACTIVITY 4

1.  $\angle 1 = 36$ ,  $\angle 2 = 144$ ,  $\angle 3 = 36$ ,  $\angle 4 = 144$ ,  $\angle 6 = 144$ ,  $\angle 7, 144$ ,  $\angle 8 = 36$
2.  $\angle 1 = 102$ ,  $\angle 2 = 78$ ,  $\angle 3 = 78$ ,  $\angle 4 = 102$ ,  $\angle 5 = 102$ ,  $\angle 6$  and  $\angle 7 = 78$



# ANSWER GUIDE

## ACTIVITY 5

$$\begin{aligned} 1. \quad 2x - 13 &= x + 3 \\ 2x - x &= 3 + 13 \\ x &= 16. \end{aligned}$$

$$\begin{aligned} \text{Thus, } a &= 19 & b &= 161 \\ c &= 19 & d &= 161 \end{aligned}$$

$$\begin{aligned} 2. \quad 5x + 8 + 3x - 2 &= 180 \\ 8x + 6 &= 180 ; 8x = 174 \\ x &= 21.75 \end{aligned}$$

$$\begin{aligned} \text{Thus, } a &= 21.75 & b &= 158.25 \\ c &= 21.75 & d &= 158.25 \end{aligned}$$

## ACTIVITY 6

- |                             |             |                |
|-----------------------------|-------------|----------------|
| 1. TRUE                     | 2. TRUE     | 3. TRUE        |
| 4. Same-side Exterior angle | 5. Interior | 6. 120 degrees |

## ACTIVITY 7

- |                                |   |             |
|--------------------------------|---|-------------|
| 1. $x = 95$                    | 2. $X + 74 = 180; x = 180 - 74 ; x = 106$ | 3. $X = 80$ |
| 4. $X = 180 - 56 = 24; y = 56$ | 5. $Y = 180 - 29 = 151; x = 29$           |             |
| 6. $2x = 180 ; x = 90; y = 90$ |   |             |

## ACTIVITY 8

$$\begin{aligned} 1. \quad 6x - 13 &= 8x - 61 \\ -13 + 61 &= 8x - 6x \\ 48 &= 2x \\ 24 &= x \end{aligned}$$

$$8(24) - 61 = 131$$

$$\begin{aligned} 3y + 1 + 131 &= 180 \\ 3y + 132 &= 180 \\ 3y &= 48 \\ y &= 16 \end{aligned}$$

The measurement of other angles are 131 and 49.



# ANSWER GUIDE

## ACTIVITY 8

$$\begin{aligned}2. \quad 8a + 1 + 27a + 4 &= \\ 180 \\ 35a + 5 &= 180 \\ 35a &= 175 \\ a &= 5\end{aligned}$$

$$8(5) + 1 = 41$$

$$\begin{aligned}B + 10 &= 41 \\ B &= 41 - 10 = 31\end{aligned}$$

$$\begin{aligned}135 + 4 &= 139 \\ 8a + 1 &= 41 \\ B + 10 &= 41\end{aligned}$$

$$\begin{aligned}K + 8 + 6k - 58 &= 90 \\ 7k - 50 &= 90 \\ 7k &= 140 \\ K &= 20\end{aligned}$$

$$\begin{aligned}K + 8 &= 28 \\ 6k - 58 &= 62\end{aligned}$$

## ACTIVITY 9

1. No,  $a$  and  $b$  are supplementary angles so their angle measurement must have a sum of 180 degrees.
2. Yes, because the sum of  $a$ ,  $b$ ,  $c$ , and  $d$  is 360 degrees. This is also the sum of the angles of a circle.
3. Yes, it is possible if  $a = 90$ . With this,  $a$ ,  $b$ ,  $c$ , and  $d$  will be congruent angles.

## ACTIVITY 10

Answers may vary.



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